

IN THE CLAIMS

1. (Canceled)

2. (Currently Amended) The system according to claim + 6, wherein said network is an Asynchronous Transfer Mode (ATM) network.

3. (Currently Amended) The system according to claim + 6, wherein said network is a Frame Relay network.

Claims 4-5 (Canceled)

6. (Currently Amended) ~~The system according to claim 5,~~ A system for protecting a network comprising:

a plurality of links located in said network;

a transmitter switch comprising a transmitter line card coupled to a first end of each link of said plurality of links, for transmitting distinct data along each link of said plurality of links before a failure is detected on one of said plurality of links; and

a receiver switch, coupled to a second end of each link of said plurality of links, for receiving said distinct data from each link of said plurality of links;

wherein said distinct data transmitted along said one link of said plurality of links is switched to another link of said plurality of links when the failure is detected on said one link, wherein said distinct data transmitted along each link of said plurality of links comprises cells, and wherein said transmitter line card further comprises a transmitter classifier module for classifying said cells transmitted along each link of said plurality of links, a plurality of transmitter queuing buffers coupled to said classifier module, for receiving and storing said cells, and a transmitter multiplexing module coupled to each buffer of said plurality of transmitter queuing buffers and to each link of said plurality of links, for directing said cells stored in each buffer in a predetermined order to a corresponding link of said plurality of links.

7. (Original) The system according to claim 6, wherein said transmitter switch receives a virtual connection setup request and assigns at least one virtual connection corresponding to said virtual connection setup request alternatively to each buffer of said plurality of transmitter queuing buffers.

8. (Original) The system according to claim 7, wherein said at least one virtual connection is associated with said cells transmitted along each link of said plurality of links.

9. (Original) The system according to claim 7, wherein said transmitter switch assigns said at least one virtual connection to each buffer of said plurality of transmitter queuing buffers in such a way so as to ensure that each link has a balanced load.

10. (Original) The system according to claim 8, wherein said transmitter classifier module allocates said cells to each buffer of said plurality of transmitter queuing buffers based on association with said at least one virtual connection, in such a way so as to ensure that each link has a balanced load.

11. (Original) The system according to claim 6, wherein each buffer of said plurality of transmitter queuing buffers includes a plurality of Quality of Service (QoS) category queues.

12. (Original) The system according to claim 6, wherein said transmitter line card further comprises a transmitter processor for monitoring each link of said plurality of links and for programming said transmitter multiplexing module to switch said distinct cells transmitted along said one link of said plurality of links to said another link when said failure is detected on said one link.

13. (Original) The system according to claim 6, wherein said receiver switch further comprises a receiver line card coupled to said second end of each link of said plurality of links.

14. (Original) The system according to claim 13, wherein said receiver line card further comprises a receiver multiplexing module coupled to each link of said plurality of links, for merging said cells received on each link of said plurality of links and a receiver classifier module coupled to said receiver multiplexing module, for classifying and outputting said cells to a plurality of receiver queuing buffers.

15. (Original) The system according to claim 14, wherein said receiver line card further comprises a receiver processor for monitoring each link of said plurality of links and for instructing said transmitter processor of said failure of said one link.

16. (Currently Amended) The system according to claim 56, wherein each cell comprises a transmission header having a virtual circuit identifier (VCI).

17. (Currently Amended) The system according to claim 56, wherein each cell comprises a transmission header having a virtual path identifier (VPI).

18. (Canceled)

19. (Previously Presented) A system for protecting a network comprising:
a plurality of links located in said network;
a transmitter switch, coupled to a first end of each link of said plurality of links, for transmitting distinct data along each link of said plurality of links; and
a receiver switch, coupled to a second end of each link of said plurality of links, for receiving said distinct data from each link of said plurality of links;
wherein said distinct data transmitted along one link of said plurality of links is switched to another link of said plurality of links when a failure is detected on said one link, wherein each link of said plurality of links includes a total bandwidth and provides a guaranteed bandwidth to a user, and wherein said total bandwidth of each link of said plurality of links is greater than a sum of said guaranteed bandwidth provided by any two links of said plurality of links.

20. (Currently Amended) The system according to claim + 19, wherein said transmitter switch further comprises a plurality of transmitter line cards, each transmitter line card being coupled to said first end of a corresponding link of said plurality of links.

21. (Original) The system according to claim 20, wherein said distinct data transmitted along each link of said plurality of links comprises cells.

22. (Original) The system according to claim 21, wherein each transmitter line card of said plurality of transmitter line cards further comprises a transmitter classifier module for classifying said cells transmitted along each corresponding link, a plurality of transmitter queuing buffers coupled to said classifier module for receiving and storing said cells, and a transmitter multiplexing module coupled to each buffer of said plurality of queuing buffers and to said corresponding link of said plurality of links for directing said cells stored in one buffer of said plurality of queuing buffers to said corresponding link and said cells stored in all remaining buffers of said plurality of queuing buffers to a disposal bin.

23. (Original) The system according to claim 22, wherein said transmitter switch receives a virtual connection setup request and assigns at least one virtual connection corresponding to said virtual connection setup request alternatively to each buffer of said plurality of transmitter queuing buffers.

24. (Original) The system according to claim 23, wherein said at least one virtual connection is associated with said cells transmitted along each link of said plurality of links.

25. (Original) The system according to claim 23, wherein said transmitter switch assigns said at least one virtual connection to each buffer of said plurality of transmitter queuing buffers in such a way so as ensure that each link has a balanced load.

26. (Original) The system according to claim 24, wherein said transmitter classifier module allocates said cells to each buffer of said plurality of transmitter queuing buffers based on

association with said at least one virtual connection, in such a way so as to ensure that each link has a balanced load.

27. (Original) The system according to claim 22, wherein each buffer of said plurality of transmitter queuing buffers includes a plurality of Quality of Service (QoS) category queues.


28. (Original) The system according to claim 22, wherein each of said transmitter line cards further comprises a transmitter processor for monitoring each link of said plurality of links and for programming said transmitter multiplexing module to switch said cells directed to said disposal bin to said corresponding link when said failure is detected.

29. (Original) The system according to claim 22, wherein said receiver switch further comprises a plurality of receiver line cards, each receiver line card being coupled to said second end of a corresponding link of said plurality of links.

30. (Original) The system according to claim 29, wherein each receiver line card of said plurality of receiver line cards further comprises a receiver multiplexing module coupled to said second end of said corresponding link of said plurality of links for receiving said cells, and a receiver classifier module coupled to said receiver multiplexing module for classifying and outputting said cells to a plurality of receiver queuing buffers.


31. (Original) The system according to claim 30, wherein each receiver line card of said plurality of receiver cards further comprises a receiver processor for monitoring said corresponding link, for detecting a failure of said corresponding link, and for instructing said transmitter processor corresponding to said link of said failure.

32. (Canceled)

 33. (Currently Amended) The method according to claim ~~32~~ 45, wherein said network is an Asynchronous Transfer Mode (ATM) network.

34. (Currently Amended) The method according to claim ~~32~~ 45, wherein said network is a Frame Relay network.

35. (Currently Amended) The method according to claim ~~32~~ 45, wherein said distinct data transmitted along each link of said plurality of links comprises cells.

 36. (Original) The method according to claim 35, further comprising:
receiving a virtual connection setup request; and
assigning at least one virtual connection corresponding to said virtual connection setup request alternatively to each buffer of a plurality of transmitter queuing buffers in said transmitter switch.

37. (Original) The method according to claim 36, wherein said at least one virtual connection is associated with said cells transmitted along each link of said plurality of links.

38. (Original) The method according to claim 36, further comprising assigning said at least one virtual connection to each buffer of said plurality of transmitter queuing buffers in such a way so as to ensure that each link has a balanced load.

39. (Original) The method according to claim 37, further comprising:
classifying said cells within said transmitter switch;
storing said cells within said plurality of transmitter queuing buffers; and
directing said cells stored in each buffer of said plurality of transmitter queuing buffers in a predetermined order to a corresponding link of said plurality of links.

40. (Original) The method according to claim 39, wherein, in said storing, said cells are alternatively stored in each buffer of said plurality of transmitter queuing buffers.

41. (Original) The method according to claim 39, further comprising, in said storing, allocating said cells to each buffer of said plurality of transmitter queuing buffers based on association with said at least one virtual connection, in such a way so as to ensure that each link has a balanced load.

42. (Currently Amended) The method according to claim 3245, further comprising monitoring each link of said plurality of links for failure and programming a multiplexing module to switch said plurality of cells directed to said one link of said plurality of links to said another link when said failure is detected on said one link.

43. (Original) The method according to claim 35, further comprising:
merging said cells received on each link of said plurality of links;
classifying said cells; and
outputting said cells to a plurality of receiver queuing buffers.

44. (Canceled)

45. (Previously Presented) A method for protecting a network comprising:
providing a plurality of links between a transmitter switch and a receiver switch located within said network;
transmitting distinct data from said transmitter switch on each link of said plurality of links;
switching said distinct data transmitted along one link said plurality of links to another link of said plurality of links when a failure is detected on said one link; and
receiving said distinct data to said receiver switch within said network, wherein each link of said plurality of links includes a total bandwidth and provides a guaranteed bandwidth to a user and wherein said total bandwidth of each link of said plurality of links is greater than a sum of said guaranteed bandwidth provided by any two links of said plurality of links.

Claims 46-48 (Canceled)

49. (Currently Amended) The transmitter switch according to claim 4851, wherein said network is an Asynchronous Transfer Mode (ATM) network.

50. (Currently Amended) The transmitter switch according to claim 4851, wherein said network is a Frame Relay network.

51. (Currently Amended) ~~The transmitter switch according to claim 48,~~ A transmitter switch for protecting a network comprising:

at least one input line card for receiving data in said network; and
a transmitter line card coupled to said at least one input line card;
said transmitter line card coupled to each link of a plurality of links in said network;
said transmitter line card transmitting distinct cells of said data along each link of said plurality of links before a failure is detected on one link and switching said distinct cells transmitted along said one link to another link when the failure is detected on said one link,
wherein said transmitter line card further comprises a transmitter classifier module for classifying said cells transmitted along said each link of said plurality of links, a plurality of transmitter queuing buffers coupled to said classifier module, for receiving and storing said cells, and a transmitter multiplexing module coupled to each buffer of said plurality of transmitter queuing buffers and to each link of said plurality of links for directing said cells stored in each buffer in a predetermined order to a corresponding link of said plurality of links.

52. (Original) The transmitter switch according to claim 51, wherein at least one virtual connection corresponding to a received virtual connection setup request is assigned alternatively to each buffer of said plurality of transmitter queuing buffers.

53. (Original) The transmitter switch according to claim 52, wherein said at least one virtual connection is associated with said cells transmitted along each link of said plurality of links.

54. (Original) The transmitter switch according to claim 52, wherein said at least one virtual connection is assigned to each buffer of said plurality of transmitter queuing buffers in such a way so as to ensure that each link has a balanced load.

55. (Original) The transmitter switch according to claim 53, wherein said transmitter classifier module allocates said cells to each buffer of said plurality of transmitter queuing buffers based on association with said at least one virtual connection, in such a way so as to ensure that each link has a balanced load.

56. (Original) The transmitter switch according to claim 51, wherein each buffer of said plurality of transmitter queuing buffers further includes a plurality of Quality of Service (QoS) category queues.

57. (Original) The transmitter switch according to claim 51, wherein said at least one transmitter line card further comprises a transmitter processor for monitoring each link of said plurality of links and for programming said transmitter multiplexing module to switch said distinct cells transmitted along said one link of said plurality of links to said another link when said failure is detected on said one link.

58. (Canceled)

59. (Currently Amended) The transmitter switch according to claim ~~58~~61, wherein said network is an Asynchronous Transfer Mode (ATM) network.

60. (Currently Amended) The transmitter switch according to claim ~~58~~61, wherein said network is a Frame Relay network.

61. (Currently Amended) ~~The transmitter switch according to claim 58,~~ A transmitter switch for protecting a network comprising:

at least one input line card for receiving data in said network; and

a plurality of transmitter line cards coupled to said at least one input line card;
each transmitter line card being coupled to a corresponding link of a plurality of links in
said network;

each transmitter line card transmitting distinct cells of said data along each link of said
plurality of links before a failure is detected on one of said plurality of links and switching said
distinct cells transmitted along said one link to another link when the failure is detected on said
one link, wherein each transmitter line card of said plurality of transmitter line cards further
comprises a transmitter classifier module for classifying said cells transmitted along said
corresponding link of said plurality of links, a plurality of transmitter queuing buffers coupled to
said classifier module, for receiving and storing said cells, and a transmitter multiplexing module
coupled to each buffer of said plurality of transmitter queuing buffers and to said corresponding
link of said plurality of links for directing said cells stored in one buffer of said plurality of
queuing buffers to said corresponding link and said cells stored in all remaining buffers to a
disposal bin.

62. (Original) The transmitter switch according to claim 61, wherein at least one
virtual connection corresponding to a received virtual connection setup request is assigned
alternatively to each buffer of said plurality of transmitter queuing buffers.

63. (Original) The transmitter switch according to claim 62, wherein said at least one
virtual connection is associated with said cells transmitted along each link of said plurality of
links.

64. (Original) The transmitter switch according to claim 62, wherein said at least one
virtual connection is assigned to each buffer of said plurality of transmitter queuing buffers in
such a way so as to ensure that each link has a balanced load.

65. (Original) The transmitter switch according to claim 63, wherein said transmitter
classifier module allocates said cells to each buffer of said plurality of transmitter queuing

buffers based on association with said at least one virtual connection, in such a way so as to ensure that each link has a balanced load.

66. (Original) The transmitter switch according to claim 61, wherein each buffer of said plurality of transmitter queuing buffers further includes a plurality of Quality of Service (QoS) category queues.

67. (Original) The transmitter switch according to claim 61, wherein each transmitter line card further comprises a transmitter processor for monitoring each link of said plurality of links and for programming said transmitter multiplexing module to switch said cells directed to said disposal bin to said corresponding link when said failure is detected.

Claims 68-77 (Canceled)

78. (Currently Amended) An apparatus, comprising:
means for receiving data in a network;
means for transmitting distinct cells of said data along each link of a plurality of links in said network before a failure is detected on one of said plurality of links; and
means for switching said distinct cells transmitted along said one link to another link when the failure is detected on said one link, wherein each link of said plurality of links includes a total bandwidth and provides a guaranteed bandwidth to a user and wherein said total bandwidth of each link of said plurality of links is greater than a sum of said guaranteed bandwidth provided by any two links of said plurality of links.

79. (Previously Presented) The apparatus of claim 78, further comprising:
means for receiving a virtual connection setup request; and
means for assigning at least one virtual connection corresponding to said virtual connection setup request alternatively to each buffer of a plurality of transmitter queuing buffers.

80. (Previously Presented) The apparatus of claim 79, further comprising means for assigning said at least one virtual connection to each buffer of said plurality of transmitter queuing buffers in such a way so as to ensure that each link has a balanced load.

81. (Previously Presented) The apparatus of claim 79, wherein said at least one virtual connection is associated to said cells transmitted along each link of said plurality of links, and wherein the apparatus further comprises:

means for classifying said cells;

means for storing said cells within each buffer of said plurality of transmitter queuing buffers; and

means for directing said cells stored in said each buffer in a predetermined order to a corresponding link of said plurality of links.